### Engraving Cycle SINUMERIK Operate



Engraving cycle

The SINUMERIK Operate interfaces offer a preconfigured engraving cycle for the engraving of components. This is available on milling machines and on turning machines.

The cycle is used to engrave an arbitrary text along a line or arc. The text can be created as fixed text in a text field or as variable text with variables.

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#### 1. Introduction

The engraving of workpieces is a frequent application particularly in series production. Consecutive serial numbers, the production date or simply the name of the company are engraved. The engraving cycle provides a quick solution for all these applications.

The following descriptions are intended for operators of CNC machines who have experience with or knowledge of the SINUMERIK CNC with SINUMERIK Operate user interface. An example is shown of engraving with ShopMill (milling). The procedure is nearly identical with ShopTurn (turning).





#### 2. General information on the engraving cycle

### Call of the engraving cycle

The engraving cycle is called in the NC program via the **Milling > Engraving** softkeys.

	Tullip	τ II			
ABC	N80	Engraving	"Number of pieces <####	###,_E_PART[0]+50>"	Engraving
G	N85 ;	Engraving variab	le number of pieces without	: leading ZEROS¶	
ABC	N90	Engraving	"Number of pieces <#,_E	_PART[0]>"	
G	N95 ;	Engraving variab	le number of pieces without	: leading ZEROS¶	
G	N100	; with start numb	er¶		
ABC	N105	Engraving	"Number of pieces,_E	_PART[0]+10>"	
END		End of program			
				>	
	Edi	Drilling 🛃	Milling Cont. mill.	Vari- ous Simu-	Ex-

### **Engraving cycle dialog**

The parameter assignment is performed with the aid of the clearly arranged dialog.

Engra	ving	Select	
Т	KUGELKOPF_Z	<mark>YL_D2</mark> D 1	tool
F	500.000	mm/min	
FZ	150.000	mm/min	Graphic
S	2500.000	rpm	view
Mirror	writing		
Alignm	nent	ABC	
Ref. p	oint		
Numb	er of pieces <#	#####,_E_P	
ART[0	]>	_	
		_	
110	40.000		
XØ	10.000		
YØ	150.000		
20	0.000		
Z1	0.300	inc	
u	10.000		
DX1	3.000		
α1	0.000	0	

- Specify the tool and the cutting data.
- Alignment and reference point of the engraving. The text can be engraved as a semicircle or along a line.
- Text field for the free input of text and variables. Text and variables can be mixed arbitrarily.
- Position, size of the text field, font width and depth of the engraving.
- Feedrate when immersing the engraving tool.





### Text and variables input options

Different formatting options and predefined variables can be used in the free input field for the text. They can be called via the vertical softkey bar.



### • Special characters

Special characters can be inserted from the overview.

#### • Lower-case

Lower-case letters can be entered after pressing the softkey. Press it again to enter upper-case letters.

### • Variables

Predefined variables for date, time, quantity, numbers and variable text read from variables, e.g. \_VAR\_NUM or \_VAR\_TEXT. Instead of these variables, you can also use other numeric variables, e.g. R parameters, and text variables.



### 3. Use of variables

Predefined and free variables can be used for the free text input. The variables can be combined arbitrarily, i.e. you can engrave the date and time together with the quantity.

### Overview of the variables

Variable	Description		
Date	You can engrave workpieces with the production date, for example. The values for the date are read from the NCK.		
	The date is inserted in the European format ( <dd>.<mm>.<yyyy>).</yyyy></mm></dd>		
	To obtain a different notation, you must adapt the format specified in the text field. For example, to engrave the date in American notation (month/day/year => 8/16/04), change the format to <m>/<d>/<yy>.</yy></d></m>		
Time	You can engrave workpieces with the time, for example. The values for the time are read from the NCK.		
	The time is inserted in European format ( <time24>). To obtain the time in American format, change the format to <time12>.</time12></time24>		
	Example:		
	Text input: Time: <time24> Time: 16.35</time24>		
	Time: <time12> Time: 04.35 PM</time12>		
Quantity	You can engrave the quantity with a fixed number of places and leading zeros, "Quantity 000123", or a variable number of places, "Quantity 123".		
	The syntax in the input field appears as follows: <###,_E_PART[0]>. The # is a placeholder for a number. For example, 001 is engraved as quantity for the first part. If you only enter one #, ShopMill numbers the quantity consecutively and adds the missing places when the number of places increases, e.g 9, 10, 11		





Number	With number, you engrave an arbitrary number with a specific format. The syntax appears as follows: <#.###,_VAR_NUM>. A number is formatted with an arbitrary number of places in front of the decimal point and three places after the decimal point. The places in front of the decimal point are increased automatically. This format can be changed.
	Examples:
	<#,_VAR_NUM> arbitrary number of places in front of the decimal point, no places after the decimal point
	<#.##_VAR_NUM> arbitrary number of places in front of the decimal point, places after the decimal point rounded off to two places
Variable text	You can accept and engrave the text from a variable (max. 200 characters)VAR_TEXT is used per default. You can also use any other text variable.

The \_VAR\_NUM and \_VAR\_TEXT variables can be found in the channel-specific user variables. You can open these with the following softkeys.





=

MENU SELECT > Parameter > User variable > Channel-specific user variables. The two variables are listed there.



		04/21/15 3:57 PM
Channel-specific user variables	SGUD	R
_TC_DIR	-10	Jariables
_TC_N_WZ	0	
_TC_A_WZ	0	Global
_TC_A1	0	GUD
_TC_A2	0	
_TC_NUM	0	Channel
_TC_FR_I	0	GUD
_var_num	0	
_VAR_TEXT		Local
_SC_FIRST_CONT	0	LUD
_SC_LAST_CONT	0	
_SC_CONT_NAME[0]		
		GUD 📐
		selection
		Search
		Jearth
	Maga-	Cotting
list wear	zine offset R variable	SD data

#### Note:

The display of the SGUD may have to be changed via the vertical GUD selection softkey in order to display the \_VAR\_NUM and \_VAR\_TEXT variables.





#### 4. Sample programs

The sample programs have been created with SINUMERIK Operate V4.4 Ed. 3. A full radius cutter D2/R1 is used as tool. This has the name "KUGELKOPF\_ZYL\_D2" in the program. The engraving depth is 0.3 INC.

### Layout of the engravings (GRAVURANORDGMOEGL\_01.MPF)

This program contains examples of possible layouts for engravings.

			04/21/15 3:58 PM
NC/	UKS/	NGRAVING/GRAVURANORDGMOEGL_01_EN 1	Select
Ρ	N5	rogram header Block G54 🕞 🗖	tool
G	N10	Normal text engraving upper and lowercase¶	
G	N15	Horizontal arrangement¶	Build 📐
ABC	N20	ngraving "CNC4you SINUMERIK"	Jroup
G	N25	Vertical arrangement¶	
ABC	N30	ngraving "CNC4you SINUMERIK" S	earch
G	N35	Arrangement under any angle¶	
ABC	N40	ngraving "CNC4you SINUMERIK"	
G	N45	Circular arrangement to top¶	Mark
ABC	N50	ngraving "CNC4you SINUMERIK"	
G	N55	Circular arrangement down¶	
ABC	N60	ngraving "CNC4you SINUMERIK"	Сору
G	N65	Arrangement full circle¶	
ABC	H70	ngraving "CNC4you SINUMERIK"	De ete
G	N65	Arrangement mirrored horizontally¶	aste
ABC	N70	ngraving "CNC4you SINUMERIK"	
END		nd of program	Cut
			out
	b _	Vari- Simu- Vari- Simu-	Ex-
	Ed	Drilling 🚰 Milling 🚰 mill.	ecute

Machining step editor for the GRAVURANORDGMOEGL\_01\_EN.MPF program



### SINUMERIK The CNC solution for the shopfloor





Simulation of the GRAVURANORDGMOEGL\_01\_EN.MPF program

 ShopMill and ShopTurn Engraving Cycle

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### Engraving of quantities, predefined variables and special characters (GRAVURMOEGL\_01.MPF)

This program contains examples of the programming of special characters, upper-/lower-case text and predefined variables.

			04/21/15 4:01 PM
NC/	UKS/	/ENGRAVING/GRAVURMOEGL_01_EN 1	Select
Ρ	N5	Program header Block G54	tool
G	N10	; Engraving normal text, upper and lowercase¶	
ABC	N15	Engraving "CNC4you by SINUMERIK"	Build
G	N20	; Engraving Special Character Selection prog.¶	group
ABC	N25	Engraving "Special Character ==> Ø @ ?!"	
G	N30	; Engraving variable: date¶	Search
ABC	N35	Engraving "Variable date: <dd>.<mm>.<yyyy> long form"</yyyy></mm></dd>	
ABC	N40	Engraving "Variable date: <dd>.<mm>.<yy> short form"</yy></mm></dd>	
ABC	N45	Engraving "Variable date: <m>.<d>.<yy> amerik. format"</yy></d></m>	Mark
G	N50	; Engraving variable: time¶	
ABC	N55	Engraving "Variable time: <time12> engl. Format"</time12>	
ABC	N60	Engraving "Variable time: <time24> germ. Format"</time24>	Сору
G	N65	; Engraving variable number of pieces with leading ZEROS¶	
ABC	H70	Engraving "Number of pieces <######,_E_PART[0]>"	Deale
G	N75	; Engraving variable number of pieces of predetermined starting	Paste
	num	ber¶	
ABC	N80	Engraving "Number of pieces <######,_E_PART[0]+50>"	Cut
G	N85	; Engraving variable number of pieces without leading ZEROS¶	out
ABC	N90	Engraving "Number of pieces <#,_E_PART[0]>"	
G	N95	; Engraving variable number of pieces without leading ZEROS¶	NN
G	N1 Ø	A · with start number	
	Ъ	Cont Jari- Simu- M	E Ev-
	E	it Drilling Milling mill.	ecute

Machining step editor for the GRAVURMOEGL\_01\_EN.MPF program



### **SINUMERIK** The CNC solution for the shopfloor

# SIEMENS

	04/21/15 4:02 PM
	<b>→</b>
Number of pieces 17 Number of pieces 7	1
Number of places 000057 Number of places 000007	↓ I
Variable time: 16:02 germ, Format Variable time: 04:02 PM engl. Format	
Variable date: 4.21.15 amerik. format Variable date: 21.04.15 short form Variable date: 21.04.2015 least form	
Special Character => \$ @ ?! CNC4vmi by SINUMERIK	
A =5.500 T 0.000 Z 100.000 H 0.000 T KUGELKOPF_ZYL_DZ DT END End of program C 0.000 Rapid trav 120% 00:16:19     ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ► ►	K Back
Edit Drilling Milling Cont. Vari- ous Hilling	NC Ex- ecute

Simulation of the GRAVURMOEGL\_01\_EN.MPF program



### Engraving of freely definable variables for text and numbers (GRAVURMOEGL\_02.MPF)

This program contains examples of the engraving of variable texts.

					04/21/15 4:02 PM
NC/	WKS,	ENGRAVING/GRAVURI	10EGL_02_EN	1	Select
Ρ	N5	Program header	Block G54		tool
ABC	N10	Engraving	"Number of pieces <#,_E_PART[0]+10>"		
G	N15	; Engraving vari	able number format in the 1000s $\P$		Build
ABC	H20	Engraving	"Number <#.###,_VAR_NUM> with 1000 f	ormat"	group
G	N25	; Engraving vari	able number without 1000 format ¶		
ABC	N30	Engraving	"Number <####,_VAR_NUM> without 100	0 format"	Search
G	N35	; MENU SELECT -	TOOLS / ZERO POINTS - R parameters¶		
ABC	N40	Engraving	"Number <####,R1> R-Parameter"		
G	N45	; The variable _	VAR_NUM belongs in the variable group SG	UD¶	Mark
G	N50	; Procedure to s	et the variable¶		
G	N55	; MENU SELECT -	PARAMETER - R-user variable¶		
G	N60	; Channel GUD¶			Сору
G	N65	; May need to be	selected with GUD GUD selection¶		
ABC	H70	Engraving	"Number <#.###,_VAR_NUM>"	F	Death
ABC	N75	Engraving	"Text <text,_var_text>"</text,_var_text>		Paste
END		End of program			
					Cut
					Gut
				<ul> <li>✓</li> </ul>	
	E E	lit 🕂 Drilling 🖌	Milling Cont.	Simu-	NC Ex-

Machining step editor for the GRAVURMOEGL\_02\_EN.MPF program





Simulation of the GRAVURMOEGL\_02\_EN.MPF program





### 5. Further information on the Internet

#### **Creation of work plans**

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### Manuals and information from the Siemens AG

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